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AUTHORITY

AGO ltr 29 Apr 1980

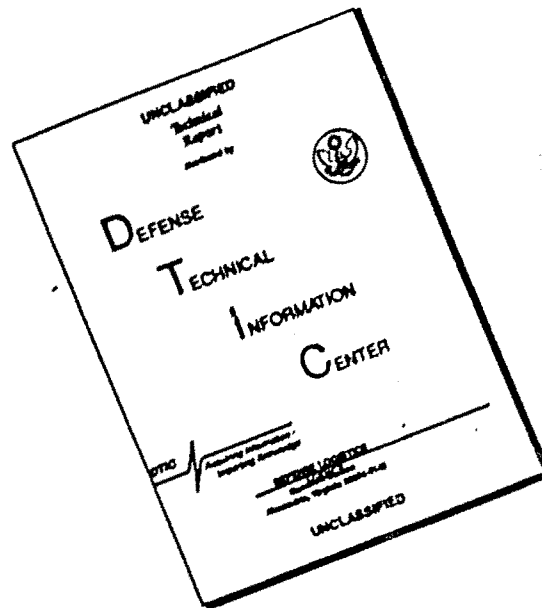
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**DEPARTMENT OF THE ARMY**  
OFFICE OF THE ADJUTANT GENERAL  
WASHINGTON, D.C. 20310

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AD831863

IN REPLY REFER TO

AGAM-P (M) (8 Dec 67) FOR OT RD-670532

18 December 1967

**SUBJECT:** Operational Report - Lessons Learned, Headquarters, 864th  
Engineer Battalion (Construction), Period Ending 31 July 1967

**TO:** SEE DISTRIBUTION

1. Subject report is forwarded for review and evaluation by USACDC in accordance with paragraph 6f, AR 1-19 and by USCONARC in accordance with paragraph 6c and d, AR 1-19. Evaluations and corrective actions should be reported to ACSFOR OT within 90 days of receipt of covering letter.

2. Information contained in this report is provided to insure appropriate benefits in the future from Lessons Learned during current operations, and may be adapted for use in developing training material.

BY ORDER OF THE SECRETARY OF THE ARMY:

*Kenneth G. Wickham*

KENNETH G. WICKHAM  
Major General, USA  
The Adjutant General

1 Incl  
as

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CO, 864th Engineer Battalion (Const)

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MAY 14 1968

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670532

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DEPARTMENT OF THE ARMY  
864TH ENGINEER BATTALION (CONSTRUCTION)  
APO SAN FRANCISCO, 96312

EGACBC-3

8 August 1967

SUBJECT: Operational Report - Lessons Learned (RCS CSFOR-65) for  
Quarterly Period Ending 31 July 1967

THRU: Commanding Officer  
35th Engineer Group (Construction)  
APO 96312

Commanding General  
18th Engineer Brigade  
APO 96377

Commanding General  
US Army Engineer Command Vietnam (Prov)  
ATTN: AVCC-P&O  
APO 96491

Commanding General  
United States Army, Vietnam  
ATTN: AVCGH-DH  
APO 96307

Commander in Chief  
United States Army, Pacific  
ATTN: GPOP-OP  
APO 96588

TO: Assistant Chief of Staff for Force Development  
Department of the Army (ACSFOR DA),  
Washington, D. C. 20310

Section 1. Significant Organization or Unit Activities.

1. The battalion is organized under TOE 5-115E dated 5 August 1965, having changed from TOE 5-115D dated 19 July 1960 on 12 June 1967. Its attached units are the 171st Engineer Detachment (Well Drilling) and the Asphalt Platoon of the 102nd Engineer Company (Construction Support).

2. During the period covered by this report the battalion has undergone several changes in its organizational structure. On 19 May 1967, the 39th Engineer Detachment (Concrete Mixing and Placing), formerly attached, was reassigned by the 35th Engineer Group (Construction) to the 87th Engineer Battalion (Construction). Also on 20 May 1967, the 588th Engineer Detachment (Well Drilling), formerly attached, was reassigned to the 14th Engineer Battalion (Combat).

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1 January 1969

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8 August 1967

SUBJECT: Operational Report - Lessons Learned (RCS CSFOR-65) for  
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3. This reporting period was highlighted by numerous personnel changes in all key staff positions; XO, S-1, S-3, S-4 and the change of two unit commanders. Also the former Battalion Commander completed his tour on 31 July 1967. (See Inclosure 1). Fortunately, incumbents were able to brief their replacements prior to departure resulting in an efficient transition. Additionally, there were major changes in our operational areas. The shift of the Battalion's construction effort off the Cam Ranh Peninsula that began during the latter half of the last reporting period was virtually completed during this quarter. Our major construction projects on Cam Ranh Peninsula, the construction of an 8630 Man Cantonment Area, the operation of one of the largest military quarry complexes, the operation of a concrete mixing plant and many minor construction tasks were reassigned to the 87th Engineer Battalion (Construction). This reassignment permitted the Battalion to concentrate on the priority task of rehabilitating and paving the Vietnamese National Highway QL-1 from Ba Ngoi (shown on the map as Cam Lam) to Dien Khanh, west of Nha Trang. This task required the establishment of a quarry site in the Ba Ngoi area, so that crushed rock for base preparation would be readily available to the road construction crews. This location eliminated the long haul of crushed rock from the Cam Ranh Peninsula quarry complex. From the middle of June until the end of July, Company A and portions of Companies B and D supported by the Asphalt Platoon of the 102nd Engineer Company were intensively engaged in the road building operation. At Nha Trang, Company C plus support elements from the Battalion continued with its major project on Hon Tre Island and the construction of a 7500 man cantonment area at Camp McDermott. The work on Hon Tre Island consisted of an access road to the tactical site at the top of a mountain on the island, a cantonment area, signal facilities, dog kennels and the drilling of two wells. Towards the latter portion of the period the requirement to complete the construction of a 2500 man cantonment area in Nha Trang, originally being constructed by contract made it necessary to further shift Battalion resources to Nha Trang. Company B moved the remainder of its unit to Nha Trang to complete the work in the high priority cantonment area. By the end of the period, plans were being finalized for the movement of the Battalion Headquarters to Nha Trang. Preparations for the move tentatively scheduled for mid-August are presently in progress. Specific activities of each subordinate unit follows:

a. Headquarters and Headquarters Company continued to perform its normal support functions. The S-1 section had a complete change of personnel. The draftsmen, surveyors and soils men of the S-2/3 section were heavily committed during the period, particularly on road rehabilitation. More than seven miles of road were surveyed and profiles prepared. Soils technicians conducted numerous tests on subbase and base material and conducted tests on the asphalt produced by Company A. This was the first real opportunity for the Battalion to make extensive use of the valuable skills of the soils personnel. Their knowledge of soils testing demonstrated the excellent training received by these personnel at the MOS school at Fort Belvoir. The S-4 section processed several thousand requisitions for project materials. Their mission was especially difficult because of the dispersion of the companies of the Battalion. Additional handling and coordination were required in order to get materials and equipment to Nha Trang from Cam Ranh Bay. Excellent support has been received from logistics agencies in handling and expediting our requisitions.

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b. Company A was relieved of the responsibility of operating the Cam Ranh Bay Quarry Complex in order to open a quarry at Ba Ngoi in support of the road rehabilitation. The Ba Ngoi quarry is operated with a single 75 TPH Eagle crusher, one crawler rock drill, two dozers that feed the crusher with blast rock and one scoop loader for the load-out of base course material. During this reporting period, 25,000 cubic yards of 2"(-) rock ~~was~~ produced, averaging 700 cubic yards per day. Additionally, Company A operates a crusher (75 TPH) on Hon Tre Island producing rock for a penetration macadam surface for the access road discussed in paragraph 3. In Nha Trang, Company A personnel operated a former contractor-operated crusher complex on the Nha Trang Air Base on a limited basis. They have produced enough concrete aggregate to sustain construction progress in the area. This equipment is scheduled for relocation to a new quarry to be opened at Suoi Hoa to support road construction north of our present location in Cam Ranh. The Battalion's widely spread projects have continuously taxed the unit's maintenance capability. Heavy earthwork requirements on Hon Tre Island, Highway QL-1, and at Nha Trang created equipment problems never before anticipated. Company A has also been assigned the mission of keeping the recently obtained civilian contractor equipment in operation. These items primarily included compaction equipment such as self propelled pneumatic rollers and 10 ton steel wheeled rollers.

c. Company B has been constantly on the move during the period. With one of its platoons at Nha Trang, plans were formulated to relocate the remaining elements to the Nha Trang area after completion of projects in the Cam Ranh area. In May 1967, the unit was relieved of its largest project, the construction of the 8630 Man Cantonment Area. The emphasis of the unit was concentrated on two major projects: A STRATCOM Facility in the Dong Ba Thin area located along Highway QL-1 and a BOQ Trailer Park at Cam Ranh. The STRATCOM Facility consisted of a transmitter and receiver site for complex signal equipment and the Trailer Park consisted of a site for 140 trailers. In mid-June, Highway QL-1 rehabilitation became the Battalion's priority project. The requirement for an early completion of the southern section of this project necessitated the relocation of Company B from the Cam Ranh Peninsula. During the period 19 June to 25 July the company rehabilitated 3.5 miles of road for paving. Upon completion of this phase of the road, another priority project, mentioned in paragraph 3.b., developed when contract construction was terminated and a 2500 Man Cantonment area was designated for completion ~~by~~ troop units. Since a platoon of Company B was represented in the area and Company C was heavily committed on Hon Tre Island, the remainder of Company B was relocated to Nha Trang on 29 July 1967 to undertake their new missions.

d. Company C has been continuously engaged in construction on Hon Tre Island and in Nha Trang. A 600 Man Cantonment area on the island is almost complete and the remaining work is primarily the self-help phase of construction by the using agency under engineer supervision. Following the completion of the construction of a dog kennel on the island, the construction of a microwave relay building was started. However, the major effort continued to be the construction of an access road to the tactical site at the top of the mountainous island. Although the ~~for~~ ~~official~~ ~~use~~ ~~only~~ construction was

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directed in order to reduce grades below 20 percent. The new road is approximately 60 percent complete and the penetration macadam surface course is being placed. The road is scheduled for completion in the fall and will have an all-weather capability. The remaining effort of Company C is committed to the Nha Trang area. During the period, the company completed a Topo Operations Facility consisting of a large metal prefab map storage building and a van shed. They also completed ten 40' x 100' Pasco steel warehouses, and continued work on Camp McDermott, a cantonment area for 7500 personnel. Parts of the cantonment area are occupied, but construction is expected to continue until April 1968.

e. Company D continued to be the Battalion's major road builders. Their major project has been the rehabilitation of Highway QL-1 from Ba Ngoi to Dien Khanh, a distance of approximately 30 miles. In early May, the first phase of the project, the section of road between My Ca and Dong Ba Thin, a distance of 3.5 miles, was completed. The second phase, 7.2 miles, from My Ca south to Ba Ngoi is heavily travelled by local labor personnel employed at military installations and a vital link for military traffic to the central depot at Cam Ranh. These factors created a requirement to complete the road by 1 August 1967 and resulted in assigning Company B to reinforce Company D. Some specifications developed in the course of work on this project are shown in Inclosure 2. This section of the highway was completed on 30 July despite extremely heavy traffic. This vital stretch of road is well designed and constructed and is a fine example of military construction in this category of project. Toward the end of the period the unit began preparations for the remaining road rehabilitation northward to Nha Trang. These preparations involve the relocation of Company D to Dong Ba Thin on 8 August, placing the company near the start of Phase III of the four phases of this 30 mile project. Other significant unit accomplishments during the period included the completion of a 80' x 200' APO building on Cam Ranh Peninsula and extensive drainage structure repairs in the Cam Ranh area. The unit also began construction of precast concrete bridges to be utilized where bridges are required on Highway QL-1. To date two bridges of this type have been installed; the first one was emplaced on Cam Ranh Peninsula and the second on Highway QL-1. The bridge, designed by engineers of this Battalion, received high praise from higher headquarters. The bridge design has been modified slightly by reduced width of the stringers and it is destined to become the standard short span bridge for the road rehabilitation projects by Army engineer units throughout Vietnam.

f. The Asphalt Platoon of the 102nd Engineer Company (CS), attached to the battalion for operational control has been continuously engaged in operating their asphalt plant and paving Highway QL-1. During the period they paved approximately 10 miles of road and produced several thousand tons of asphalt. The platoon set an unpredicted record of paving 2.6 miles of single lane (12' wide) asphalt pavement in a two day period.

g. The 171st Engineer Detachment (Well Drilling) has been attached to Company C during this period and continued their well drilling operations on Hon Tre Island. Difficulties have frequently been encountered in drilling through fissure rock formations. The need for additional drill bits was temp-

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orarily a problem, but has now been alleviated. The well completed last period has been in continuous operation feeding a 250 barrel water storage tank. The installation of a 1,000 barrel tank will augment the present storage system in the near future.

4. The Battalion had scheduled training for 13 half days during the period. Mandatory subjects are presented on Sunday mornings and in the evenings. Some classes were cancelled during the period, since the Battalion often worked on Sunday mornings on a seven-day a week schedule. Normal command inspections were also conducted on Sunday mornings in preparation for the upcoming Annual General Inspection in October 1967.

### Section 2, Part I, Observations (Lessons Learned).

#### a. Administration

##### Records Handling

ITEM: Mailing of personnel records is not being expeditiously accomplished.

DISCUSSION: Current Department of the Army policy directs the mailing of military records from losing unit to gaining unit of all personnel, except those in grades E-9, W-4, O-4 and above, who have DDALV instructions in their orders. This policy has caused undue hardships on individuals concerned, as their records are not being promptly mailed. Additionally, assignments of selected personnel frequently change when they arrive in country. Considerable periods of time elapse before their records arrive at their new station. The Battalion presently has twenty-five personnel with temporary records because their records were either not mailed or lost enroute.

OBSERVATION: Personnel should carry their own individual records upon reassignment to Vietnam. Experience has proven the present system ineffective and steps should be taken to correct deficiencies in the current system.

#### b. Equipment

##### Maintenance

ITEM: The standard Army lubricant (GAA) has proven ineffective for wheel bearings on the Le Tourneau-Westinghouse scraper.

DISCUSSION: An excessive number of wheel bearings on the Le Tourneau-Westinghouse scraper have become defective. The problem is attributed to the lubricant (GAA) which breaks down under the high temperatures in which the equipment is currently being operated. To remedy the situation, ball and roller bearing grease was used and found to hold up considerably better.

OBSERVATION: Additional research should be accomplished to ascertain if our experience and solutions are correct.

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8 August 1967

SUBJECT: Operational Report -- Lessons Learned (RCE CSFOR-65) for  
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### c. Construction Operations

#### Asphalt Paving

ITEM: Breakdown rolling of AP-3 asphalt pavements having a 6 percent bitumen content.

DISCUSSION: In the past the battalion employed a 5-8 ton smooth wheeled roller to breakdown freshly placed asphalt pavement, and followed it with a pneumatic tired roller after breakdown had been accomplished. Recently, a 10 ton, three wheeled tricycle roller has been employed to breakdown the asphalt pavement. This is followed by a smooth wheeled tandem roller and a rubber tired pneumatic roller.

OBSERVATION: Recent compaction tests revealed that the breakdown with the 10 ton tricycle roller gives compaction results that vary from five to ten percent higher than compaction achieved with the 5-8 ton roller.

ITEM: Parking of rollers on freshly paved roads.

DISCUSSION: In paving operations with long haul distances there are periods when breakdown rollers are required to remain idle and be parked until more pavement is placed. Care must be taken to park rollers so that the surface will not be damaged by the depressions due to the weight of the roller on the warm and still plastic asphalt.

OBSERVATION: Breakdown rollers should be parked far enough back on the cooled pavement to preclude surface damage.

#### Quonset Erection

ITEM: Placement of channel iron and bolts.

DISCUSSION: When erecting quonsets, the bolts for the channel iron are placed at the prescribed spacing as part of the forming of the concrete pad. Other times, errors in spacing bolts require replacement by chipping concrete which is a slow and tedious process. The solution to prohibit placing bolts in error is to place channel plates on the freshly poured concrete and the bolts placed before the concrete sets. The channel plate will serve as an excellent template and eliminate spacing errors completely.

OBSERVATION: The latter technique has worked remarkably well and is especially adaptable for self-help construction personnel who are a lot less skilled than construction engineers.

### d. Logistics

#### Civilian Equipment

ITEM: Manuals and repair parts for former civilian equipment are needed.

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SUBJECT: Operational Report - Lessons Learned (RCS CSFOR-65) for  
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DISCUSSION: Recently Army engineer units have received numerous items of equipment (e.g. pneumatic rollers, steel wheeled rollers etc.) from civilian contractors. This equipment has been received in various states of repair. After a few days on the job some of the equipment has broken down. Difficulties have been encountered in making the necessary repairs because neither manuals and/or repair parts were issued with the equipment. If parts cannot be obtained from the civilian contractors in the area, or through other sources, repairs are required to be made by prefabrication. Maintenance personnel experience difficulties diagnosing the problem areas because of their unfamiliarity with the equipment. When the problem area is found, the part often cannot be obtained. Maintenance personnel are then required to tear into the part or assembly in order to find a suitable substitute part or must fabricate a new part. If parts and manuals were available, the diagnosis of the problem and the replacement of the part would be a normal operation, involving little time to repair. This additional effort to repair this vital equipment has reduced the capability for maintaining other equipment.

OBSERVATION: Since it appears that Army engineer units will continue to use this non standard equipment, repair parts and operators manuals should be immediately requisitioned if they are not received with the equipment.

### Section 2, Part II, Recommendations:

There are no additional recommendations to those inherent in the OBSERVATIONS in Part I.

2 Incl  
as

  
LAURENCE L. HEIMERL  
LTC, CE  
Commanding

### DISTRIBUTION:

- 5 - CO, 35th Engr Gp (Const)
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EGA-3 (8 August 1967)

1st Ind

SUBJECT: Operational Report - Lessons Learned for the Quarterly Period  
Ending 31 July 1967


HEADQUARTERS, 35TH ENGINEER GROUP (CONSTRUCTION, APO 96312, 12 August 1967

TO: Commanding General, 18th Engineer Brigade, ATTN: AVBC-OP, APO 96377

1. This headquarters has reviewed the report submitted by the 864th Engineer Battalion (Construction), and considers it an excellent report of unit activities and accomplishments for the period ending 31 July 1967.

2. Inclosure 1 contains End-of-Tour Notes prepared by the former Battalion Commander, LTC Ray S. Hansen. In general, I concur in the observations made and in the opinions as stated. LTC Hansen commanded the 864th Battalion (Construction) for a year. During that time he continuously gave deep thought to problems encountered by engineer construction units in Vietnam and aggressively sought solutions to those problems. His comments deserve study, and consideration should be given to the implementation of many of his recommendations.

1 Incl  
as

  
G. H. NEWMAN  
Colonel, CE  
Commanding

8

AVBC-C (8 Aug 67) 2nd Ind Lt Hegmann/dky/DBT-163  
SUBJECT: Operational Report - Lessons Learned For the Quarterly Period  
Ending 31 July 1967

12  
28 AUG 1967

Headquarters, 18th Engineer Brigade, APO US Forces 96377

TO: Commanding General, U.S. Army Engineer Command, Vietnam (Prov),  
ATTN: A.CC-P&O, APO US Forces 96491

1. This headquarters has reviewed the report submitted by the  
864th Engineer Battalion and considers it an excellent report of unit  
activities and accomplishments for the period ending 31 July 1967.

2. This headquarters concurs with the observations and recommen-  
dations of the Battalion Commander.

  
HAROLD J. ST. CLAIR  
Colonel, CE  
Commanding

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AVCC-P&O (8 Aug 67) 3d Ind CPT Whitley/dmr/LBN 4581  
SUBJECT: Operational Report - Lessons Learned for the Quarterly Period  
Ending 31 July 1967

HEADQUARTERS, UNITED STATES ARMY ENGINEER CORPS  
VIETNAM (PROV), APO 96491

2 NOV 1967

TO: Commanding General, United States Army Vietnam, ATTN: AVHGC-DH,  
APO 96375

1. This headquarters concurs with the 864th Engineer Battalion's ORIL and previous indorsements as written, subject to comments (a) through (c). Comments on the previous battalion commander's End of Tour Notes are provided in paragraph 2.

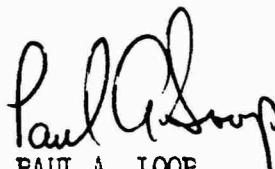
a. Reference Section 2, Part I, paragraph a, page 5: Personnel now hand carry their records enroute to overseas' assignments.

b. Reference Section 2, Part I, paragraph b, page 5: High temperature grease was successfully substituted for GAA by the 809th Engineer Battalion in Thailand. Wheel bearing lubricant was not required.

c. Reference Section 2, Part I, paragraph d, page 5: This headquarters has initiated action through AVCC-M msg number 3150, dtd 26 July 67, requesting "owners" of referenced equipment to make known their requirements for technical manuals.

2. With respect to the End of Tour Notes, this headquarters considers them to be a provocative reflection of problem areas as seen from the battalion commander's point of view. His comments and recommendations will be of considerable value in the broader consideration of these problem areas.

FOR THE COMMANDER:



PAUL A. LOOP  
Colonel, CE  
Chief Of Staff

2 Incl  
nc

Cys Furn:

CG, 8th US Army, ATTN: Engr  
CG, 18th Engr Bde  
CO, 35th Engr Gp  
CO, 864th Engr Bn

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AVHGC-DST (8 Aug 67) 4th Ind  
SUBJECT: Operational Report-Lessons Learned for the Period Ending  
31 July 1967 (RCS CSFOR-65) (U)

HEADQUARTERS, UNITED STATES ARMY VIETNAM, APO San Francisco 96375 7 NOV 1967

TO: Commander in Chief, United States Army, Pacific, ATTN: GPOP-OT,  
APO 96558

1. (U) This headquarters has reviewed the Operational Report-Lessons Learned for the period ending 31 July 1967 from Headquarters, 864th Engineer Battalion (Construction) (CW4A) as indorsed.

2. (U) Concur with report as indorsed. Report is considered adequate.

FOR THE COMMANDER:

2 Incl  
nc

*for* *Stanley E. Scholt*  
STANLEY E. SCHOLT:  
Major, AGC  
Asst Adjutant General

cc: HQ, 864th Engr Bn (Const)  
HQ, US Army Engr Comd

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GPOP-DT(8 Aug 67)

5th Ind

SUBJECT: Operational Report for the Quarterly Period Ending 31 July 1967  
from HQ, 864th Engr Bn (UIC: WCW4AA) (RCS CSFOR-65)

HQ, US ARMY, PACIFIC, APO San Francisco 96558

1 DEC 1967

TO: Assistant Chief of Staff for Force Development, Department of the  
Army, Washington, D. C. 20310

This headquarters has evaluated subject report and forwarding  
indorsements and concurs in the report as indorsed.

FOR THE COMMANDER IN CHIEF:



2 Incl  
nc

HEAVRIN SNYDER  
CPT, AGC  
Asst AG

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DEPARTMENT OF THE ARMY  
HEADQUARTERS, 864TH ENGINEER BATTALION (CONST)  
APO 96312

EGACBC-CO

31 July 1967

SUBJECT: End-of-Tour Notes

THRU: Commanding Officer  
35th Engr Gp (Const)  
APO 96312

THRU: Commanding General  
18th Engr Bde (Const)  
APO 96377

TO: Commanding General  
USAECV(P)  
APO 96491

1. This letter is in response to your request for end-of-tour comments and recommendations from outgoing Bn CO's. I admit that these notes suffer from a hurried verbosity in general and from insufficient detail on some specifics; I will be glad to try to furnish more of the latter if desired. My tone may sound pessimistic; but I am sure you would prefer I state the problem areas, rather than dwell on how good we all are--on which we probably spend too much time already.

2. I have two overwhelming impressions on this very intense and I hope productive tour: The first is how very vital our overall US involvement, and our specific engineer role, is to the Vietnamese people--and for that matter to all the "little" people throughout the world. One of the most satisfying aspects of our work has been that the lines of communications and the ports which we are building will be the catalyst for their prosperity, general welfare and continued future progress.

3. The second major observation is how marginally, if even adequately, we Army Engineers are equipped, trained, and organized for truly supporting today's Army. We have produced neither with the speed nor the quality which should be within our capability or which our supported forces deserve. I think that we have done reasonably well with what we have had to work with, but the overall results are probably only half of what our national potential

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Inclosure 1

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EGACBC-CO

SUBJECT: End-of-Tour Notes

31 July 1967

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would permit.

a. Equipment. Whereas our nation is the technological leader of the world, and its largest single industry is construction (and related construction equipment), yet the majority of our life blood Army Engineers equipment is inadequate or of archaic vintage. Several of our specific items were even manufactured before their soldier-operators were born! With but rare exceptions, our entire plant is one to two equipment generations behind that of any modern contractor. (We had a windfall, for example, when the contractors began closing down, and his cast-off equipment became available to us. Despite its overage and generally deadlined conditions, this equipment meant a many-fold increase in our capabilities, particularly for compaction and tractor-scraper operations).

(1) Perhaps the most critical equipment inadequacy is compaction equipment. We simply do not have, within the Army inventory, any significant capability to compact to our class 50 standard. We cannot do it at all where roads are narrow; the combination of the 290 "bobtail" with a towed roller cannot be maneuvered on narrow roads. The QL-1 project, for example, did not begin to meet compactive specifications (and in fact unravelled and failed) until we obtained heavy self-propelled pneumatic ("Tampo" model) rollers from RMK, and borrowed triple-roll sheepsfoot and large vibratory rollers from the nearby USAF Red Horse Squadron.

(2) Our present crawler tractors ("medium" size--i.e. D7E and HD16) are structurally and productively inadequate. A "heavy" (e.g. D8) size tractor is required whenever there are boulders or blast rock, such as on Hon Tre project, for example, there were at one time up to 24 tractors. Despite a doubling of maintenance services and an on-site DS Team, from half to three fourths of these HD-16 and D7E tractors normally were deadlined. This was due almost exclusively to structural breakage. Experienced civilian and military construction foremen estimated that if even half that number of heavy tractors had been available, the deadline would have been drastically reduced--and the operational tractors could produce twice as much. In other words, if heavy tractors had been available, our customers could have been operational in about half the time, with far less impact on our other operations or on maintenance services.

(3) Our vertical construction methods, materials and tools--are uneconomical of manpower and far too slow in innumerable ways.

a. The old quonsut hut surely could have been replaced by now by something easier and quicker to erect, even if not lighter. I don't believe we need to make any far-out jumps (e.g. the ill-fated "buildings in barrels"); there are many, many round or straight wall prefab buildings on the market. All contractors, and even the other services, use many of these. For buildings which are to be air conditioned, the old "Jamesway" hut is still the easiest to ship, erect and move--and has a relatively long life too. (In our ORLI's we write-up odds and ends of new methods, but in reality any meaningful

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EGACBC-CO

SUBJECT: End-of Tour Notes

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methods are going to be found in conjunction with or as a result of new materials and new tools. There are not many more variations we can make with "one-by" and "two-by" lumber, corrugated sheet metal, plain hand tools and the standard WW II drawings of TM 5-302).

b. The construction industry in the last decade or two has developed a whole new generation of tools and equipment to economize and speed their work. New tools and materials, in turn, open paths for new methods and techniques. Our friends in the USAF Red Horse squadrons embarrass us a bit in this regard, having adopted job-speeding tools such as small multipurpose tractors with backhoe, loader, auger, etc. (we borrowed one of these for the big STRATCOM transmitter and receiver site project at Dong Ba Thin. It saved about three platoon weeks, and the customer moved in that three weeks sooner) plate vibrators, line painters, and many other time savers such as a broad selection of power shop and hand tools. There are many other items which contractors find very profitable, and so could we. These include: self-contained pavement breakers and drills ("Cobra"), power nailers, very heavy duty staplers, a wider range of types and sizes of power drills and saws, prefabricated scaffolds and ladders, and a great deal of concrete equipment such as rotary finishers, vibratory screeds and pumps.

c. As to materials, in addition to prefabricated buildings mentioned above, there are innumerable improvements in building supplies and systems which should be urged--through command channels, since no such Army R&D program is known to be active. A few examples and thoughts: The Theater of Operations electrical wiring types and systems desperately need simplification; the use of split-knob insulators and single conductor wire is hardly compatible with fancy hardware such as flush-mounted boxes with separate switches or receptacles, and screw-on type cover plates (In fact, it would seem that a sort of farmers-quality type "Romex" cable would be faster and better than our split-knob insulator system); rigid conduit, with all the supply problems of its associated hardware, should be out of the question for the theater of operations except in very unusual circumstances; Wall switches are extravagant in the T/OE (pull-chain type fixtures would be far simpler and cheaper to install); roofing materials of innumerable types are now on the market--many of which would be more suitable, lighter and quicker than sheet metal (especially than the non-galvanized metal we got for a long time!); air entraining agents should be used in concrete; and, corrugated aluminum culvert pipe with prefabricated headwell sections. In all of the building trades there are innumerable types of materials which would simplify the construction, and greatly reduce the logistics of our buildings and their related utilities.

d. For obtaining some improvements on vertical construction I would make two recommendations. The first, that CG, USARV emphasize to DA the need for a formal R&D program in this field -- not necessarily "new" R&D, but an extensive evaluation of available commercial products for T/O use. The second recommendation, for interim benefit and to obtain some test results from Vietnam, is that USARV get special permission to send to CONUS

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a few experienced engineers and some Construction Foremen NCO's to buy about \$100,000 worth of the off-the-shelf building materials and related or special tools. A few guidelines might be set in advance but the "buyers" should have as free a hand as possible, commensurate with a mission of buying enough materials for several medium sized (e.g. 40 X 100) buildings. A group of a few building contractors from warmer regions of the US would undoubtedly be glad to advise the "buyers" before they start. I'm sure that a few of the widely-known prefab builders would have many sound recommendations. Administratively, the money involved could be taken from, and the materials go back into, some specific job -- and some usable, albeit test, buildings built with the supplies procured.

(4) There are several other equipment matters on which we have commented or made recommendations in recent months. ... My only additional recommendation is that command attention (i.e. USARV and MACV) constantly be given, and in turn urged on DA, to the need for a general updating of the engineer equipment family. (Care must be used, however, in order to avoid the ERUM-total-new-design R&D route!)

### b. Training

The insufficiency, or nonexistence, of training for certain key skills is a much discussed subject on which I will add a few observations. The most notorious shortcomings are in certain low density but very critical skills such as well-drilling and paving. Other individual training problems include well development, quarry/crusher site development and management, sheet metal work, plumbing, and electrical distribution. The only sources of most of these skills are OJT or prior civilian experience; yet here in Vietnam we are constructing more sophisticated structures, to higher specifications, than ever before. The OJT system is of course absurd, since there normally are few, if any, journeymen around for the OJT-man to learn from. The other system, of hoping for a man with prior civilian experience, is mostly wishful thinking (new soldiers have just not had the years experience to become adept in these more difficult skills), I recommend the following measures to help alleviate this problem:

(1) Primarily, engineer units should and could build up a reservoir of most of these skills by working in peacetime on higher type, more extensive projects than they generally got. A comparison with the Seabees is applicable here. The Mobile Construction Battalions, The Navy's equivalent of our Construction Battalion, habitually do high type work, including MCA projects such as dependent housing and major operational facilities. Army battalions, in peacetime, seldom do any high-quality horizontal jobs (7th Brigade in Europe was generally an exception) and almost never do any comprehensive vertical work. A few years ago the Chief of Engineers investigated why this is so. The results were completely contrary to the old excuse that contractor or labor unions were to blame; the main reason was simply that most district engineers, post engineers and the

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engineer unit commanders very seldom plan together or coordinate project work with an eye on the training opportunities. No doubt a contributing reason for lack of district-post-unit engineer coordination has been due in recent years to the virtual abolishment of engineer staffs at Z.I. Army Headquarters and CONARC Headquarters. A related reason for lack of job-type training was that engineer units in peacetime spend too much time on general subjects such as movement readiness. The irony of the latter was demonstrated by the 864th Battalion itself, when it left Ft. Wolters for Vietnam. The battalion moved out with amazing speed: it was at sea with its equipment\* within eight days of first being alerted! Yet the battalion, as far as we can determine in retrospect: had never done any primary or extensive secondary electric power work; had never built a class 50 road; had never drilled a well; and, had not built any buildings within ten years; This is despite the fact that Ft. Wolters had a better than average reputation for keeping its engineers occupied.

(2) The rank structure of men in these critical skills is atrocious, both within the MOS structure and within TO&E. The worst example is probably the well drilling detachment, which is authorized only one Sp-4 and one Sp-5. By contrast, the Seabee's well drilling detachment has about six men (which is a necessary number) headed by a 1st Class Petty Officer and manned by relatively high rated men. Another bad example is electricians (52F20) within the construction battalion. The highest electrician rank is Specialist-4 and the only promotion hope for him is the one SSG, E-6, Utilities Foreman (51P40) which slot is "fed" from all the many utility skills in the battalion (plumbers, masons, refrigeration Sp, heating and vent specialist, water purification sp, and, of course, the 37 total electricians). With such grades and career patterns, we can never expect to develop a respectable capability to wire cantonment areas which consume thousands of kilowatts and communications or data-processing facilities which have many hundreds of individual circuits per building. And, obviously, a talented young soldier would never think of staying in the service under those arrangements.

(3) An interim answer--but a potentially harmful one in my opinion--is the pooling of specialists into teams, to which occasionally we have resorted with electricians in particular. This system will get a

\*But with drastic shortages in PLL and ASL parts (i.e. no bulldozer parts at all). And many items of key equipment were towed in deadline status; then, many of these deadlined items were towed ashore only to end up in the Cam Ranh Bay evacuation yard without ever being operable, according to NCO's who came with the unit.

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large job done to be sure, and will permit one or two experienced men to "OJT" a maximum number of apprentices. However, the disadvantages are serious: it breaks up the balanced construction team which the platoon and squad should maintain; it is unfair to the men for it usually means long TDY away from his leadership base and source of promotion; it means that designs, BOM's, job coordination, and issuing and receipting of materials are split between the basic construction unit and the electrical team; and, it means that company officers and NCO's who run the rest of the show are not getting the responsibility or experience they should in the pooled specialty, or in its integration into the overall project.

(4) Last but not least, unit-level MOS training by teams and by individuals must be revitalized, in war as well as peace. The 864th has continued to have some MOS training by groups on a sporadic basis, often at night, and this has proven very valuable. It would help greatly if there were standard courses and lesson plans for this sort of thing--much USAFI has group conference type courses in addition to their individual correspondence courses. Colonel Harold C. Brown wrote a comprehensive letter on this and related subjects a few years ago .... Nothing that I know of ever came of his efforts, sadly enough. In fact the subject never gets much positive engineer interest, and absolutely no major command interest. Moreover, there is no longer any specific office or "desk" anywhere in the Army that has this matter under scrutiny. I do not include the Engineer Equipment School in this proposal. Every commander, and NCO, I know disagrees with the establishment of that school. The E.E.S. is, in effect, just a week or so added onto the man's AIT--not a follow-up training to improve proven individual skills and improve teamwork in units. The principal objections to the EES are three: it takes the good, job-proven NCO's out of the units that most need them to do the day-to-day OJT training and to take charge as NCOIC's of jobs; it takes desperately-needed equipment out of productive use (e.g. in the 864th's case, 15% of our grader capability); and, the very establishment of this type school seems to indicate that the AIT of Ft. Wood is inadequate, and that we theater engineers assume the responsibility for correction--instead of getting corrections made at the source.

### c. Organization

As is well known, the present TO&E/MTO&E system has become totally inflexible and unresponsive to field needs. If I had not flagrantly broken specific regulations and directives, the 864th would have had: no radio communications whatsoever (such as to Hon Tre Island or our remote quarries); insufficient welding machines to support both maintenance and construction; no means of hauling large amounts of water and hence no way of getting proper compaction; insufficient power drills and tools and thus would have taken two or three times as long to erect most prefab steel buildings; no way of handling the 5,000 average tons per month of materials which we received, stored and handled (this took two forklifts almost full time; we horsetraded for the loan of one; the other is best left unstated!); no legally provided basis of accepting the much-needed RMK equipment; and, finally, the battalion would have had no legal way of keeping two-thirds of the rock crushing equipment

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on hand and vitally needed. A few other organizational observations are as follows:

(1) We need some organization or system for "holding" or "pooling" general support engineer equipment (this is in contrast to the light equipment company, which is essentially an augmentation and a working unit). The Seabees have a system for this, although I doubt that it would work as well for the Army because our size makes our problem quite complex; they have, at fleet level (o.g. "COMCBPAC"), a pool of equipment. This contains, as I understand it, those items:

a. which their deployed CB Battalions are authorized but do not need on their specific job assignments;

b. a number of augmentation type items which units need only on special jobs; and,

c. those items of equipment which we in the Army call "Theater Reserves" for specific wartime construction jobs (but on this latter point my memory might be wrong)

In the 864th, as in most other units, there are innumerable items which have been on hand receipt or laterally transferred (now an illegal procedure!) to other units for over a year. This causes particular problems for unit commanders and supply officers. Hardly a month goes by that someone doesn't go off to survey a missing or damaged item which, through on their books, they have never before seen. In addition, a system is needed which would responsively provide general support equipment for special needs. In the brigade, for example, there is probably habitual need for at least a few airmobile (segmentable) tractors, graders, loaders and cranes (how valuable a few would have been to start the clearing on top of Hon Tre!) And, from time to time, everyone needs a really big crane—say about 60 ton. Many other items are in this category, such as concrete pumps, gunnite machines, tracked loaders, "Gradall" machines, 25 TPH crushers, "readymix" trucks, angle dozers (not needed often, but needed desperately on occasion), large size roto-tillers; and, elevating-type self propelled scrapers. For other parts of the world there could be other "pool" needs such as: snow plows, ice growser tracks, over-snow vehicles, low-ground-pressure D8's, assault trackways for sand, and mine-clearing vehicles such as the LCV-E or the roller devices.

(2) The organization of the construction company (TOE5-118E) could be changed, I believe, to include only one instead of the present two construction ("vertical") platoons—if it were equipped with some of the tools and equipment discussed in paragraph 3a(3) above. Contractors, during recent years, generally have cut their labor force in half, by using new materials and versatile new tools. For example, the light wheeled tractor with backhoe, loader and other attachments will do all work which one or two squads in a company habitually do (by hand). Other items such as power nailers, more power

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saws, and certainly readymix trucks would easily replace another squad or two. 29

(3) The "Ordnance" DS (third echelon) section, which CDC deleted in the E-series TO&E, should be returned. I have had third echelon elements from that section on detached field duty almost constantly (at Hon Tre and on QL-1). This close, responsive support is just not going to be available in the future.

(4) Three types of miscellaneous positions are not provided at all by TO&E, yet all are full-time requirements: reenlistment NCO, PIO specialist, and indigenous labor supervisors and clerks. However, in my opinion, only the latter is really needed (the others are directed positions). For the indigenous labor I recommend two foreign area specialists (one NCO and one clerk) be provided by TO&E augmentation, for those men need to know the language and the area. We have had several full time men, carefully chosen for their ability and tact, on this indigenous labor management job. Good, compassionate management of indigenous personnel has paid-off handsomely in a stable, loyal, hard working civilian force of up to 500 people at one time.

(5) Certain very low-density, high-skill teams such as well drillers, should be commanded centrally rather than attached-out to units who in reality do not know anything about their special needs. The present system of occasional visits by "floating" staff specialists is very inadequate (however, the recently-hired "pros" such as Mr. Laws and Mr. Farmer do an outstanding job; but they usually cannot stay long enough and often do not have time to brief us commanders on what we should or should not do.) As it is now, the staff inspector has all the knowledge and none of the responsibility, while the commanders to which the teams are attached have all the responsibility and no knowledge. To make matters more difficult, supply officers of units to which those teams are attached have no catalogues of parts, pumps or accessories.

(6) There have, in past years, been occasional proposals to combine the combat and construction battalions into one single type battalion. This idea deserves to be reconsidered. The construction battalion, in Vietnam and I am sure in future wars, needs more of the combat battalion's weapons, mine detectors, radios, etc. The construction battalion needs to be lighter too—perhaps by pooling certain heavy items in rear areas or in "heavy" construction companies. The combat battalion habitually needs more equipment, more maintenance capability and more of the harder skills. As to common carpentry and vertical work, the Combat Engineer (12A) and the Construction Worker (51B) end up doing about the same things and seem to do it about as well. (The 14th Combat Battalion and we have traded jobs back and forth almost at random, depending on the "hot" commitments to which one or the other has had to switch.)

(7) MOS's

a. Engineer Officer MOS's are almost completely

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worthless. Just as the differences between combat and construction battalions have become less and less, so too the 1331 and 1328 MOS's. And, of course, the "catchall" MOS 7010 is so broad as to be meaningless. Then there are the Aviation Engineers (1337), the Armored Engineers (1330), Amphibious Engineers (1363), ad infinitum. To the commander looking over a new officer's Form 66, the MOS block is seldom of any consequence. A redefinition of these MOS's is recommended--perhaps combining some, separating others, and eliminating many.

b. The new EM MOS's seem quite good in general. There is still a need, however, to break-out the Equipment Operator (62E) into various specialties--at very least a separate MOS for the grader operator. A good grader operator is a Godsend; but a 62E who has never operated a grader is a real problem. One other aspect of enlisted structure needs attention, although this is more of a TOE recommendation: Each squad should have an E-5 Sergeant. The reasons for this are many. A squad leader is hard pressed to do everything alone; squads are frequently split; the "feeder pattern" presently makes E-6 Squad Leaders directly out of E-5 Specialists--and this is too much of a single jump without the man having some command experience--which he can't really get as Sp-5. A frequent, although poor, solution is the appointment of "Acting Jacks"--temporary sergeants--but this system is actually unfair. The man must change all his specialist insignia to stripes at his own expense, then change back to specialist when he is transferred. Further, all the other men know he is just a temporary NCO, so the real purpose is not fully accomplished. Most eligible Sp-5's, in fact, prefer not to be made acting sergeant.

#### 4. Command and Management

a. Within our own organization, we continually fought the tendency towards "overmanagement" and "overcontrol". Commanders and S-3's are, in their usual urgency, tempted to insert a lot of the "how" into written or verbal orders. Much of this was eliminated by a more careful review of both the XO & CO of all staff-prepared directives, especially the plans and details. Most of the accidental "how" instructions are usually verbal, at the job site. Worse yet, this often slips over into being "nit-picking". We found that better directives, combined with better written SOP's and well-understood procedures for quality control tests, made a lot of the minor job site comments, recommendations, and changes, unnecessary. Most of the company commanders cited "over control"--especially visitors' or inspectors' job-site criticism--as one of the most frustrating and sometimes even depressing parts of their job. We believe we stopped this at our level by a policy of allowing no job-site changes or criticisms unless on-the-spot correction was clearly essential. Minor changes, suggestions, and counselling regarding mistakes were all held off until the end of the day and handled privately before or after the operations meeting, which is when CO's and S-3's discuss specific details anyway. I strongly recommend this as a general approach.

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b. The wide variations in standards of construction are difficult to understand, at least as seen from the job site. For example: One parking lot project will specify a hot mix asphalt throughout, while another gets minimal red sand stabilization. One set of EM billets gets hot water heaters, although most get only expedient cold water showers. One trailer park may have landscaping and extensive slabs, yet others are just laid out side by side with minimal preparation. Other incongruities are in the amount and type of lighting, tile floors, fans, concrete slab where wood could do, and wood buildings when Jamesway or quonsets would do.

c. Command newspapers get very little or no interest, and the cost and effort that goes into them does not appear warranted. We commanders look them over, mostly to see how we made out on our own articles printed, but I have detected no particular troop interest. The average soldier seems to like an occasional mention of his outfit (crew, company or battalion in that order) in a major paper like the Stars and Stripes, or the down to earth coverage his crew and buddies get in the rough-shod mineco newsletter, of the battalion or company. The other papers I would recommend not printing.

d. The post engineer--PA&E--system is the most cumbersome, unresponsive, ulcer-producing arrangement I have ever seen in the engineering profession or among management systems of any kind. Although it is not directly my business, I comment on it here for a few cogent reasons. First, it certainly is giving engineers in general a bad name (the customers don't know the reason their service is unsatisfactory, they only know it is bad); second, it makes our coordination work with the post engineers very difficult; and, it probably is going to drive many fine engineer officers out of the service either directly or indirectly. I have been a post engineer, which even with a loyal, cohesive work force is one of the Corps' most difficult jobs. Here, where the employees are poorly supervised, less than qualified, and totally uninspired, the post-engineer--with no command authority and only round-about administrative influence--has certainly the most frustrating, unpleasant, unproductive job in the entire Army. (And to make matters worse, PA&E's U.S. employees make far more money than, for example, the Delong Corporation people, who are perhaps the most qualified, dedicated contractor employees in Vietnam.

"A TRUE EXTRACT COPY"

*Dennis R. Britt*  
DENNIS R. BRITT  
1LT. CE  
Adjutant

/s/ Ray S. Hansen  
/t/ RAY S. HANSEN  
LTC, CE  
Commanding

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Earthwork Specs You Can "Live With" and Still Get Quality Work

Here are some field specs developed by the Engineer Section of the 35th Engr Gp and the S-3 Section of the 864th Engr Bn for work in the II Corps central coastal region of the Republic of Vietnam.

1. Subbase:

- a. Borrow materials tested and approved prior to use.
- b. In-place CBR checked before adding subbase.
- c. Lifts not to exceed 6" compacted thickness.
- d. Moisture kept within  $\pm 2\%$  of optimum.
- e. Moisture tests taken every 250' of 40' wide roadbed, and at least twice a day. One moisture test per week will be by standard oven-drying technique; others may be by "speedy" device.
- f. Density: 95% Mod. AASHO. Minimum of one test per 1000' of 40' wide roadbed, and a minimum of once a day. In-place CBR tests taken whenever doubt exists as to whether moisture and density determinations are giving adequate control.
- g. Foreman will correlate number of compactive passes of roller with soils test results, to help insure familiarity and as a guide to effort required; but number of passes will not be guiding criteria for compaction.
- h. Vertical Control:  $\pm 0.1$  foot of design elevation (crown will be maintained.)

2. Base Course:

- a. Not added until the quality control official approves subbase work.
- b. Materials tested and approved prior to use.
- c. For cohesive materials:
  - (1) Moisture:  $\pm 2\%$  of optimum.
  - (2) Density: 95% Mod. AASHO unless otherwise specified.

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d. For cohesive materials:

(1) Gradation taken whenever type of material changes, and at least weekly.

(2) Coef. of curvature of gradation between 1-3.

(3) Uniformity coefficient: Greater than 4.

e. Thickness tests will be made with probe by the grade foreman, throughout the day.

f. Vertical control:  $\pm 0.05'$ , by use of bluetops.

g. Crown and shoulders checked with expedient "crown gage" and "shoulder gage".

3. Sand-Cement Base Course

a. Cement: 10% by wt. (add 2% if surface to be used as wearing course).

b. Moisture: Test once per each 200' pass of roto-tiller. Must be at or not more than 1% more than optimum moisture content.

c. Prime (0.1-0.2 gal/sq yd) applied as soon as base can support distributor.

d. No traffic for four days.

e. No hot mix paving for four days.

f. Surface cracks sealed before paving.

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